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EXAMINER	
ART UNIT	PAPER NUMBER
2	11

DATE MAILED: 05/15/96

This is a communication from the examiner in charge of your application.

COMMISSIONER OF PATENTS AND TRADEMARKS

☐ This application has been examined ☒ Responsive to communication filed on 12/04/95 ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), 0 days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☒ Notice of References Cited by Examiner, PTO-892
2. ☐ Notice re Patent Drawing, PTO-948.
3. ☒ Notice of Art Cited by Applicant, PTO-1449 (4)
4. ☐ Notice of Informal Patent Application, Form PTO-152
5. ☐ Information on How to Effect Drawing Changes, PTO-1474
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☒ Claims 1-40 are pending in the application.

   Of the above, claims _____ are withdrawn from consideration.

2. ☐ Claims _____ have been cancelled.

3. ☒ Claims 29-36, 37/36 are allowed.

4. ☒ Claims 1,2,5,8-20,21-28,37/1,37/2,37/5,37/21,38,39,40 are rejected.

5. ☒ Claims 3,4,6,7 are objected to.

6. ☐ Claims _____ are subject to restriction or election requirement.

7. ☐ This application has been filed with informal drawings which are acceptable for examination purposes until such time as allowable subject matter is indicated.

8. ☐ Allowable subject matter having been indicated, formal drawings are required in response to this Office action.

9. ☐ The corrected or substitute drawings have been received on _____. These drawings are ☐ acceptable; ☐ not acceptable (see explanation).

10. ☐ The ☐ proposed drawing correction and/or the ☐ proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).

11. ☐ The proposed drawing correction, filed _____, has been ☐ approved. ☐ disapproved (see explanation). However, the Patent and Trademark Office no longer makes drawing changes. It is now applicant's responsibility to ensure that the drawings are corrected. Corrections MUST be effected in accordance with the instructions set forth on the attached letter "INFORMATION ON HOW TO EFFECT DRAWING CHANGES", PTO-1474.

12. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.

13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. ☐ Other

1. Claims 13,24,32 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear from "plasma formation, and/or vaporization" whether this limitation requires both plasma formation and vaporization or whether the limitation would be met by just either vaporization or plasma formation being present. In general "and/or" should not be used in claims.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 1,5,8-11,13-17,21-28, and 40 are rejected under 35 U.S.C. § 102(e) as being anticipated by Miyauchi et al.. Miyauchi et al. discloses laser heating of Aluminum of cutting at less than one nanosecond which is less than the threshold of fluence for Aluminum. (See figure 2 and column 1, line 63 to column 2, line 10 of Herziger et al. in U.S. Patent No. 4,839,493 which is not being applied to reject the claims but shows that plasma does not occur until the workpiece is at or above its evaporation temperature and that a pulse time of 10^{-7} is required with a laser intensity of I_L equal to 10^6 to 10^8 W/cm^2

to generate plasma). Consequently Miyauchi et al. must be using pulses for its power level that are less than the pulse width at which there is a change in slope of threshold fluence vs. pulse width.

4. Claims 1,8,9,10,11,13-17,21-27,and 28 are rejected under 35 U.S.C. § 102(e) as being anticipated by Zinck et al.. Zinck et al. in U.S. Patent No. 5,454,902 performs ablation below the threshold fluence; consequently Zinck et al. must be using pulses for its power level that are less than the pulse width at which there is a change in slope of threshold fluence vs. pulse width.

5. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered

therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

6. Claims 18,20 and 38 are rejected under 35 U.S.C. § 103 as being unpatentable over Miyauchi et al. in view of Kunz et al.. Kunz et al. teaches using a flexible diaphragm to change the transverse mode of the laser beam. It would have been obvious to adapt Miyauchi et al. in view of Kunz et al. to provide this to change the spot size.

7. Claims 20 and 38 are rejected under 35 U.S.C. § 103 as being unpatentable over Miyauchi et al. in view of Von Allmen et al.. Von Allmen et al. teaches ablating with a laser beam of a TEM_{11} configuration to provide essentially rectangular ablation spot size instead of a essentially round spot size with a Gaussian beam. It would have been obvious to adapt Miyauchi et al. in view of Von Allmen et al. to provide this to change the spot size of the beam on the workpiece.

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8. Claims 2,12,19/1,37/2, 37/5, 37/21,39 are rejected under 35 U.S.C. § 103 as being unpatentable over Miyauchi et al. . Official notice is taken that it is old and well known in the art to use chirp-pulse amplification to create high power short laser pulses. It would have been obvious to adapt Miyauchi et al. to provide this to efficiently create short high power laser pulses. Using laser pulses in the width time of femtoseconds to ablate

metal is old and well known. It would have been obvious to adapt Miyauchi et al. to provide this with high power spiked pulses to ablate in small areas.

9. Applicant's arguments filed December 4, 1995 have been fully considered but they are not deemed to be persuasive. The Miyauchi et al. reference discloses cutting, i.e. ablating at below the power level that vaporization occurs which is necessary for a plasma to be generated. Applicant's arguments regarding figure 3 of the instant specification are not pertinent to the Miyauchi et al. reference since it is Gold being ablated in figure 3 and not Aluminum as in Miyauchi et al.. The power level at which plasma formation occurs is dependent upon both the pulse width and the intensity of the pulses. Therefore Miyauchi et al. can have longer pulses than used in the instant application when Miyauchi et al. uses pulses of much lower intensity and still be beneath the plasma threshold. The indicated allowability of claims 21-28 is withdrawn in view of the correct interpretation of the Miyauchi et al. reference.

10. Claims 3,4,6,7, 37/6, 37/29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claims 29-31,33-36 are allowable over the prior art of record.

12.Claim 32 would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. 112.

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Herziger et al. machines at a low plasma formation level.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoff Evans whose telephone number is (703) 308-1653.

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May 13, 1996

GEOFFREY S. EVANS
PRIMARY EXAMINER
GROUP 210